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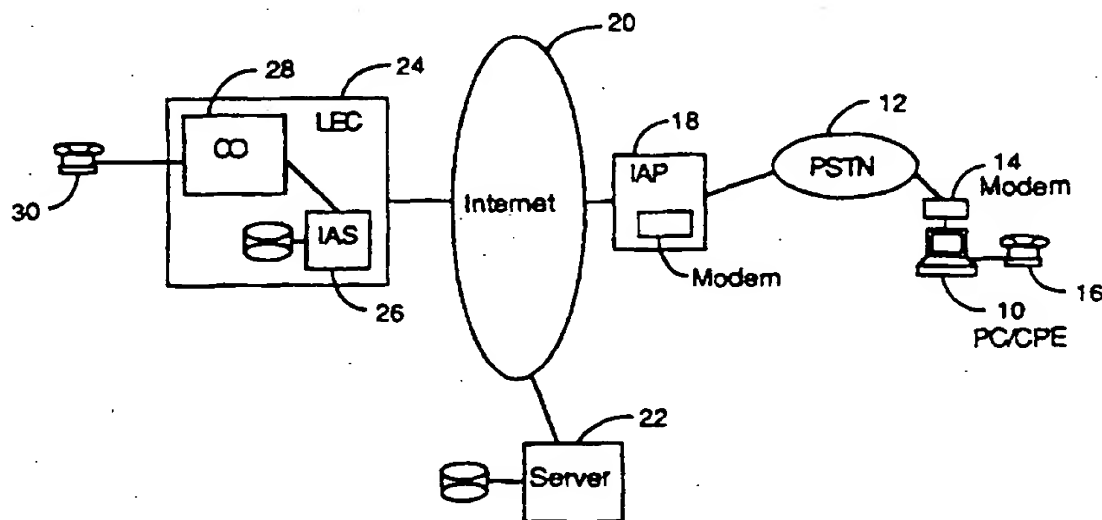
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(54) Title: TERMINATING DATA VOICE CALL ARCHITECTURE



(57) Abstract

The invention resides in the field of telecommunication network architecture which supports voice connections over data networks and publicly switched networks. In one preferred embodiment, the invention permits a voice connection between a personal computer or CPE device (10) and a plain regular telephone terminal (30), over an Internet or data network (20) and a local exchange carrier or local access provider of the PSTN (24) to which the regular telephone terminal is connected.

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TERMINATING DATA VOICE CALL ARCHITECTURE

Technical Field and Industrial Application

5 The invention generally relates to voice services over computer and/or data networks. In particular, it is directed to a service architecture by which a duplex voice call connection can be established between a computer or CPE (customer premise equipment) device and a regular telephone over wide area data networks, such as Internet, which are mainly designed for connection among computers.

10

Background of Invention

Software packages for voice communications over the Internet are now generally available for personal computers (PCs). Widespread use of the Internet voice communications packages are severely
15 inhibited because terminating access at any point in time is only available to users who happen to be actively on the "Network" (Internet) at the time of the call, and are also equipped with compatible software. Alternatively, the call may be pre-arranged via Internet mail or regular telephone communications. A product has also been
20 introduced which allows the caller to leave Internet voice messages through a PBX or key system, making it as easy to retrieve messages as using a plain telephone. Users can leave voice messages and retrieve messages using the Internet and associated PBX device. The previously mentioned Internet voice messaging product uses a store and forward
25 process unlike the present invention being presented here, which uses a live network architecture connection. The present invention allows an Internet voice call or other data voice call to be terminated at a local exchange carrier (LEC) or local access provider (LAP) so that a live voice connection can be established between a PC and a plain regular
30 telephone. Due to lack of an accepted term, this service is hereinafter called Terminating Internet Voice Call Service, or TIVC. While this specification prominently mentions "Internet", the architecture according to the invention is equally applicable to any data network. It should also be noted that in the field of telephony, "terminating a call"
35 involves several consequential steps which are performed at a terminating LEC or LAP, such as generating a ring signal, generating a

busy signal, responding to a receiver going off-hook, etc., so that a proper telephone connection is established between two parties.

There are a few problems which hinder widespread use of the TIVC service. These include terminating access ("reach") limited to
5 those who are compatibly equipped with hardware and software and are ready to receive the call; there is also no alerting mechanism for those who are inactive/disconnected from the Internet or data network (even though equipped); and there is no way to place an Internet voice call to someone with plain old telephone service (POTS) anywhere in
10 the world.

The TIVC service would be a significant growth enabler for voice traffic on Internet or other data networks in that it eliminates the three major growth inhibiting problems stated above. At the same time, the TIVC service also offers a new terminating access service opportunity
15 to LEC's (local exchange carriers) and LAPs (local access providers), consequently increasing network traffic and service revenues. As a result of the TIVC invention the number of reachable parties for a caller expands from the current limitation of only those who are equipped and active on the Internet or data network at the time the call
20 is being placed, to all global telephone subscribers (or their answering system) at any time.

Objects of Invention

It is therefore an object of the invention to provide a network
25 architecture which supports the termination of data voice traffic at a local exchange carrier (LEC) or local access provider (LAP) of the public switched telephone network (PSTN).

It is another object of the invention to provide a method of terminating data voice traffic emerging from a data network at a local
30 exchange carrier of the PSTN.

It is yet a further object of the invention to provide a network architecture in which a telephone number is converted to the data address of a serving data access system such as the Internet Access System (IAS) using a data addressing system and a telephone number
35 conversion process.

Disclosure of the Invention

Briefly stated, the invention is directed to a method of handling a data voice call set up request for the purpose of establishing a duplex voice connection between an originating CPE and a telephone terminal. The method comprises steps of responding to the voice call set up request at a translation server connected to a data network, and translating the telephone number of the telephone terminal to the data address of a data network access system. There is a further step of the data network access system responding to the originating CPE with a voice signal output.

According to another aspect, the invention is directed to a method of routing and terminating a data voice call at a local exchange carrier or local access provider from which a voice connection can be made to a regular telephone terminal to which the data voice call is destined. The method comprises steps of receiving a data voice call request and converting the data voice call request to a voice signal output. The method further includes steps of routing the voice signal output to a central switching office of the local exchange carrier or local access provider, and ringing the regular telephone terminal in response to the voice signal output.

According to yet another aspect, the invention relates to a method of establishing a duplex voice connection between an originating CPE and a called telephone terminal. The method comprises steps of the originating CPE sending a data voice call request to a data network and in response to the data voice call request, the data network sending the originating CPE a data or IP address and connection information of a data network access system connected to the data network. The method further includes steps of the originating CPE sending a data voice call to the data network access system at its data or IP address and the data network access system converting the data voice call to a voice signal output. There are further steps of routing the voice signal output to a central switching office to which the called telephone terminal has access, and the central switching office sending a ring signal to the called telephone terminal.

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Brief Description of the Drawings

Figure 1 shows schematically a network architecture according to one embodiment of the invention; and

Figures 2-4 show schematically various steps to carry out a method according to embodiments of the invention.

Mode(s) of Carrying Out the Invention

The Terminating Internet Voice Call Service, hereinafter called TIVC, is a new service which would be offered by LEC's and LAP's, enabling their customers to receive voice calls which were originated from the Internet or data network users using a computer or CPE Internet voice communication package. In one embodiment it involves Internet because it is the most widely accepted data network but it should be emphasized that the invention can be implemented using any data network.

The invention defines a new service, new method, and new architecture, which will allow an Internet or data voice caller to originate and establish a two-way voice connection using the Internet or data network, and the PSTN from a PC (personal computer) or other CPE device, terminating to a plain telephone anywhere in the world. This terminating service will generate new revenue for the LEC/LAP service providers.

The TIVC service will allow LEC/LAP to minimize lost revenue from pure Internet PC to PC voice calling, and expand the terminating reach for Internet voice callers to existing plain telephone subscribers around the world.

Figure 1 shows a network architecture according to one embodiment of the invention. It should be noted that the description that follows is only about one embodiment of the invention and there are many possible implementations to realize the inventive idea without departing from the spirit of the invention. In the figure, a PC/CPE 10 is connected to the PSTN 12 via a modem 14. The computer is equipped with a voice card or such capability so that a telephone set or microphone and speaker configuration (multi-media package) 16 or any other CPE device can be connected for voice call. An Internet access provider (IAP) 18 provides access to the PSTN connection and to the Internet 20. According to this embodiment, a server called a TIVC

server 22 (Terminating Internet Voice Call Server) provides database services of address tables containing telephone numbers, data routing information, TCP/IP addresses, etc. At a local exchange carrier 24 of the PSTN near the called party telephone set, an entity called IAS 26

5 (Internet Access System) enables the bridging between data voice call traffic from the Internet and ordinary telephone voice call traffic in the local exchange carrier containing CO equipment 28 and a plain old telephone (POTS) or other telephone set 30 of a standard telephone subscriber connected to it.

10 The accompanying Figures 2-4 schematically illustrate some typical steps of establishing voice call traffic between a PC/CPE device and an ordinary telephone set connected to a central switching office (CO) of a local exchange carrier in the embodiment described above in connection with Figure 1.

15 In Figure 2, a data voice call to a POTS is initiated at the PC/CPE by dialing or inputting a called party's PSTN telephone number. The PC/CPE is equipped with a voice card for digitizing voice. As shown by 40, through application software, the PC or CPE device launches a translation query into the Internet by way of the IAP for conversion of
20 the PSTN telephone number to data or the IP address of an IAS using a TIVC number identifier translation. The TIVC server receives the query and checks its database at 42 for conversion of the PSTN telephone number to the Internet address of the IAS, which has the capability of terminating voice call, and routing it to the called party's
25 CO. At 44, the TIVC server responds back to the originating PC/CPE with the terminating telephone number data or IP IAS address for terminating the TIVC call.

In Figure 3, the PC/CPE device receives a response from the TIVC server concerning the data or TCP/IP address at 50, and launches
30 a connection request 52 to the terminating IAS with the telephone number to be connected at the CO. The terminating IAS receives the connection request at 54 and the PC/CPE application sets up the Internet data/voice connection to the terminating office destination IAS data or IP address with an enclosed terminating call identifier. The
35 terminating IAS generates a standard outgoing call to CO equipment at 56 using a trunk or local line so that a two-way voice connection is made between the CO equipment and the originating PC/CPE device.

The central office system would then ring the standard POTS telephone through normal switching technologies. When the answering party answers the call, the complete two-way (duplex) voice path would be established to the originating PC /CPE device.

5 In Figure 4, end-to-end two-way voice connection is established between the originating PC/CPE device on the Internet and a POTS telephone on the PSTN. The terminating IAS receives the incoming call from the Internet as a data call and converts it to voice output to be routed to a standard trunk or local line of the CO equipment.

10 In one implementation, billing can be handled by the receiving IAS system using Internet, an industry accepted cash system, as required for terminating LD (Long Distance) charges, if required by the TIVC call originator.

15 It should be noted that the implementation architecture described above is one of many possible embodiments. For example, the invention can be implemented in various different ways as follows:

- a) Use of AIN (Advanced Intelligent Network) capability, whereby the IAS (Internet Access System) could interface with an AIN database to perform the telephone number to terminating data/IP address conversion and respond to the originating caller system with the terminating calling information. This implementation would be an alternative to having the conversion database co-located with the IAS system.
- 20 b) The IAS system would not have to be a separate system from the Central Office switch, but this functionality could be built into the actual Central Office switching system. The software and Central Processing Unit (CPU) could be built into the CO switch. Again, the conversion of telephone number to terminating data/IP address could be accomplished with a built-in database,
- 30 c) In addition to scenarios (a) and (b) described above for the telephone number to data or IP system translation, the Central Office switch could have built-in capability to actually "route" the TIVC call to the appropriate telephone line or trunk for termination.
- 35

WHAT IS CLAIMED IS:

1. A method of handling a data voice call set up request for the purpose of establishing a duplex voice connection between an
5 originating CPE and a telephone terminal, comprising steps of:
 responding to the voice call set up request at a translation server connected to a data network;
 translating the telephone number of the telephone terminal to the data address of a data network access system;
10 the data network access system responding to the originating CPE with a voice signal output.

2. A method of terminating a data voice call at a local exchange carrier or local access provider from which a voice connection can be
15 made to a regular telephone terminal to which said data voice call is destined, comprising steps of:
 receiving a data voice call request;
 converting the data voice call request to a voice signal output;
 routing the voice signal output to a central switching office of
20 the local exchange carrier or local access provider; and
 ringing the regular telephone terminal in response to the voice signal output.

3. A method of establishing a duplex voice connection between
25 an originating CPE and a called telephone terminal, comprising steps of:
 the originating CPE sending a data voice call request to a data network;
 in response to the data voice call request, the data network
30 sending the originating CPE a data or IP address and connection information of a data network access system connected to the data network;
 the originating CPE sending a data voice call to the data network access system at its data or IP address;
35 the data network access system converting the data voice call to a voice signal output;
 routing the voice signal output to a central switching office to which the called telephone terminal has access; and

the central switching office sending a ring signal to the called telephone terminal.

4. The method according to claim 3 wherein the CPE is a data
5 terminal such as a computer which is equipped with voice capability.

5. The method according to claim 4, wherein the step of the data
network sending the originating CPE a data or IP address of a data
access system comprises a further step of a server connected to the data
10 network searching a database.

6. The method according to claim 5 wherein the data voice call
request is based on a telephone number of a called telephone terminal.

15 7. The method according to claim 6 wherein the data voice
signal output is an industry standard outgoing call signal.

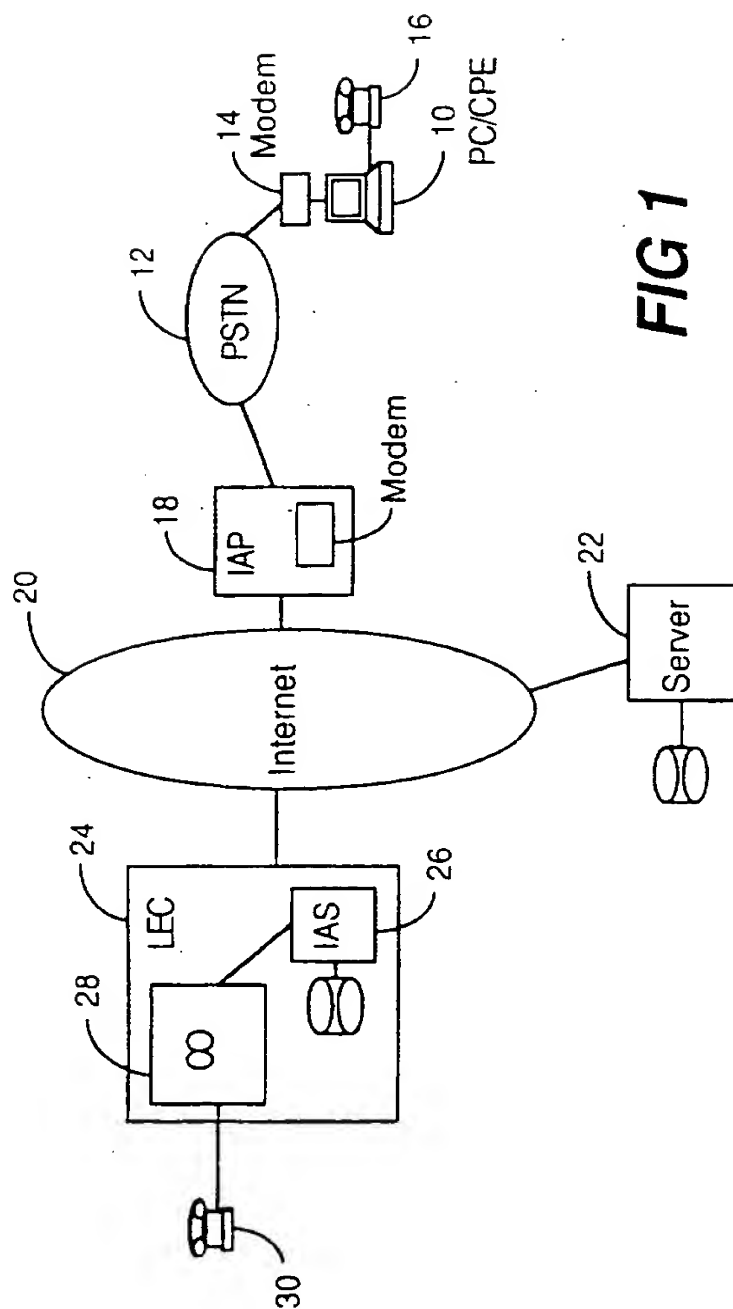
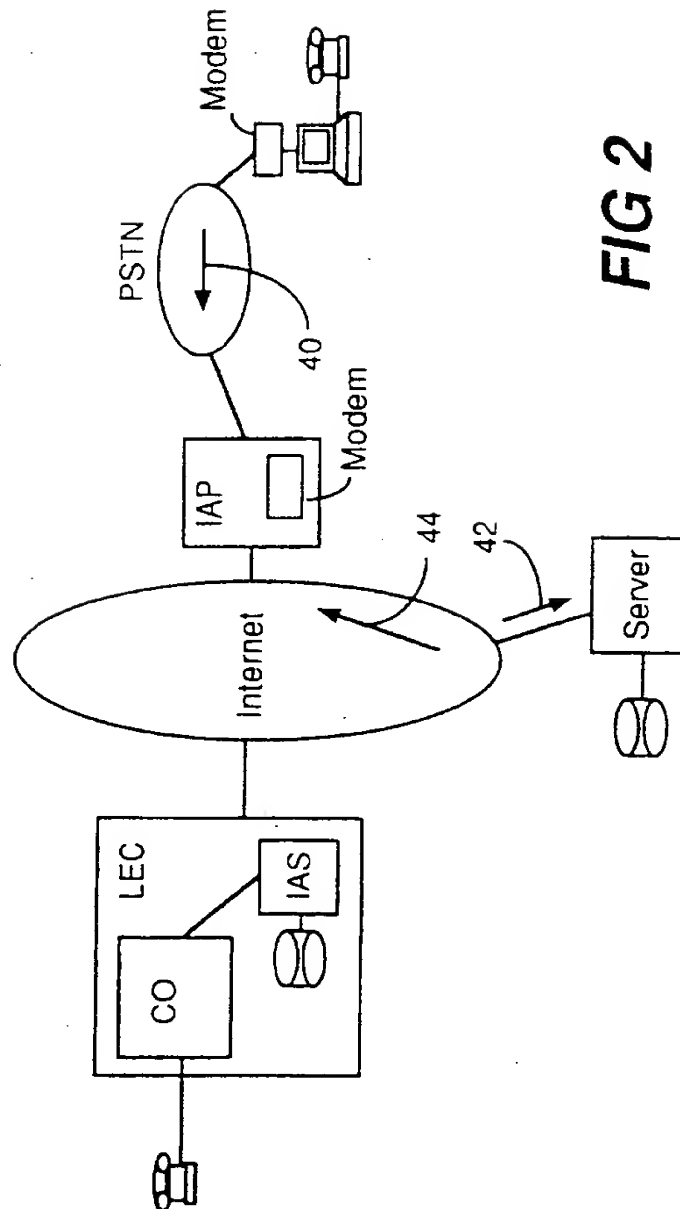


FIG 1

2/4

**FIG 2**

3/4

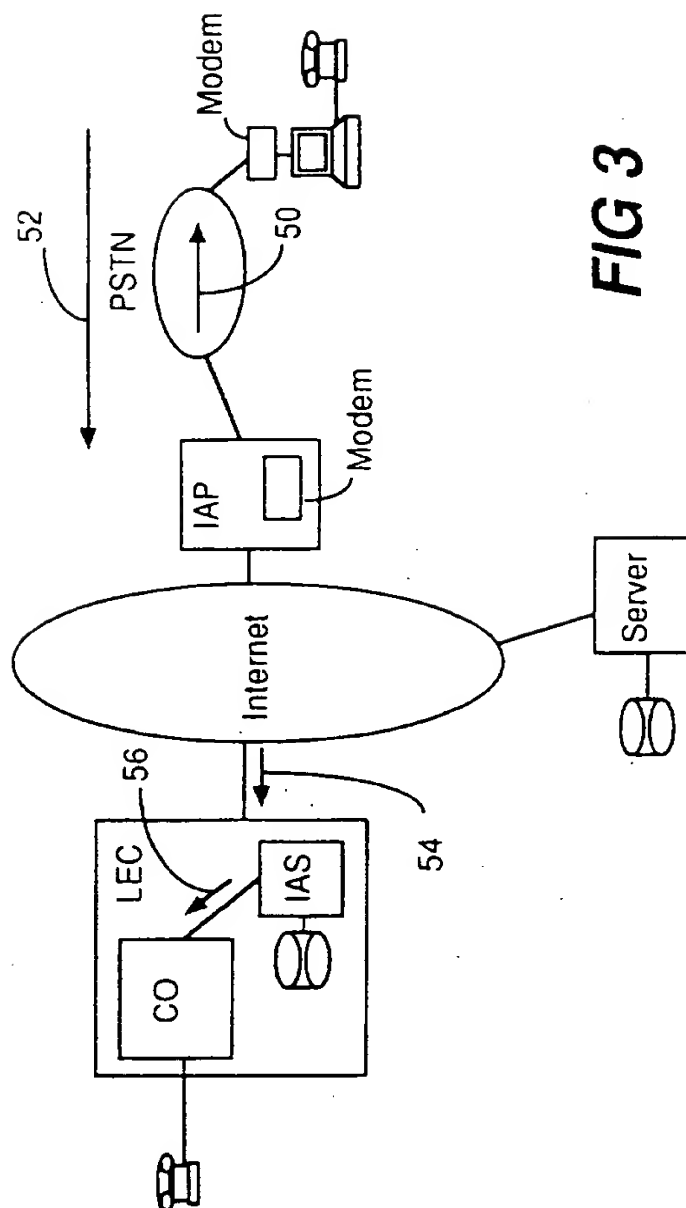


FIG 3

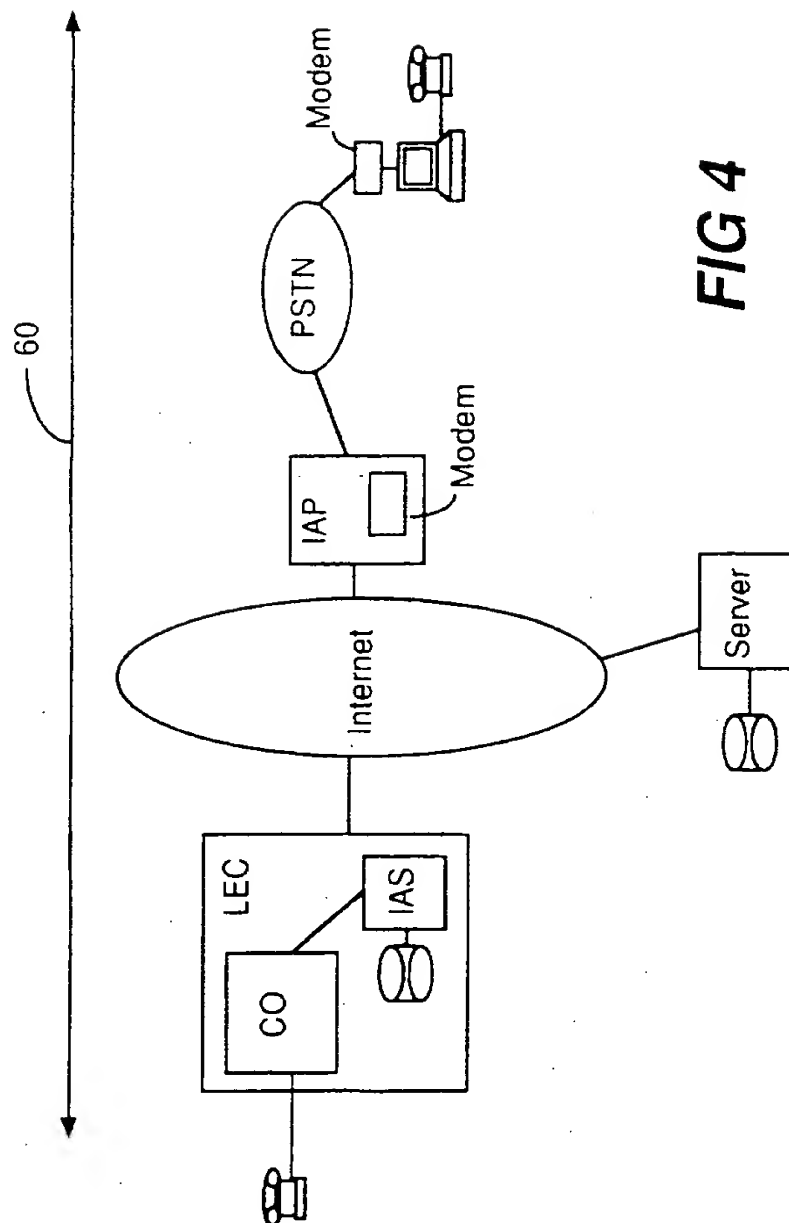


FIG 4

INTERNATIONAL SEARCH REPORT

Int. Appl. No.
PCT/CA 97/00128

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04M3/00 H04M11/00 H04L12/64

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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☒ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

23 May 1997

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C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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